

Figure 4.1
The Water
Molecule

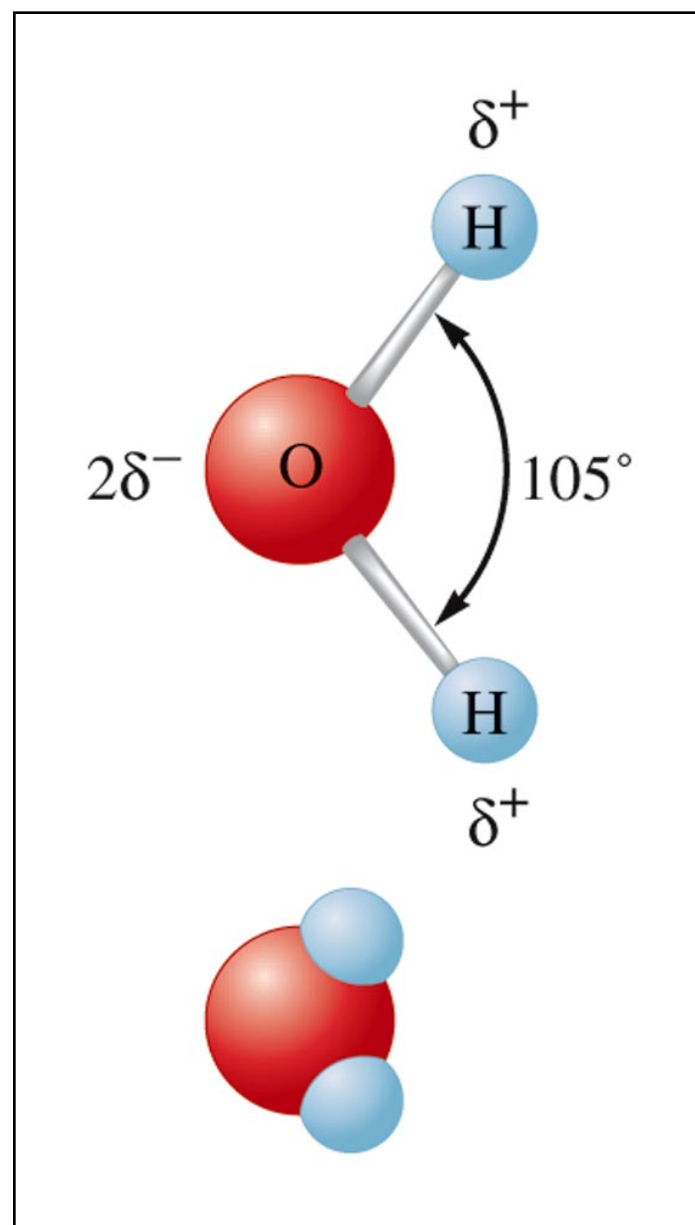


Figure 4.2 Polar Water Molecules Interact with the Positive and Negative Ions of a Salt Assisting in the Dissolving Process

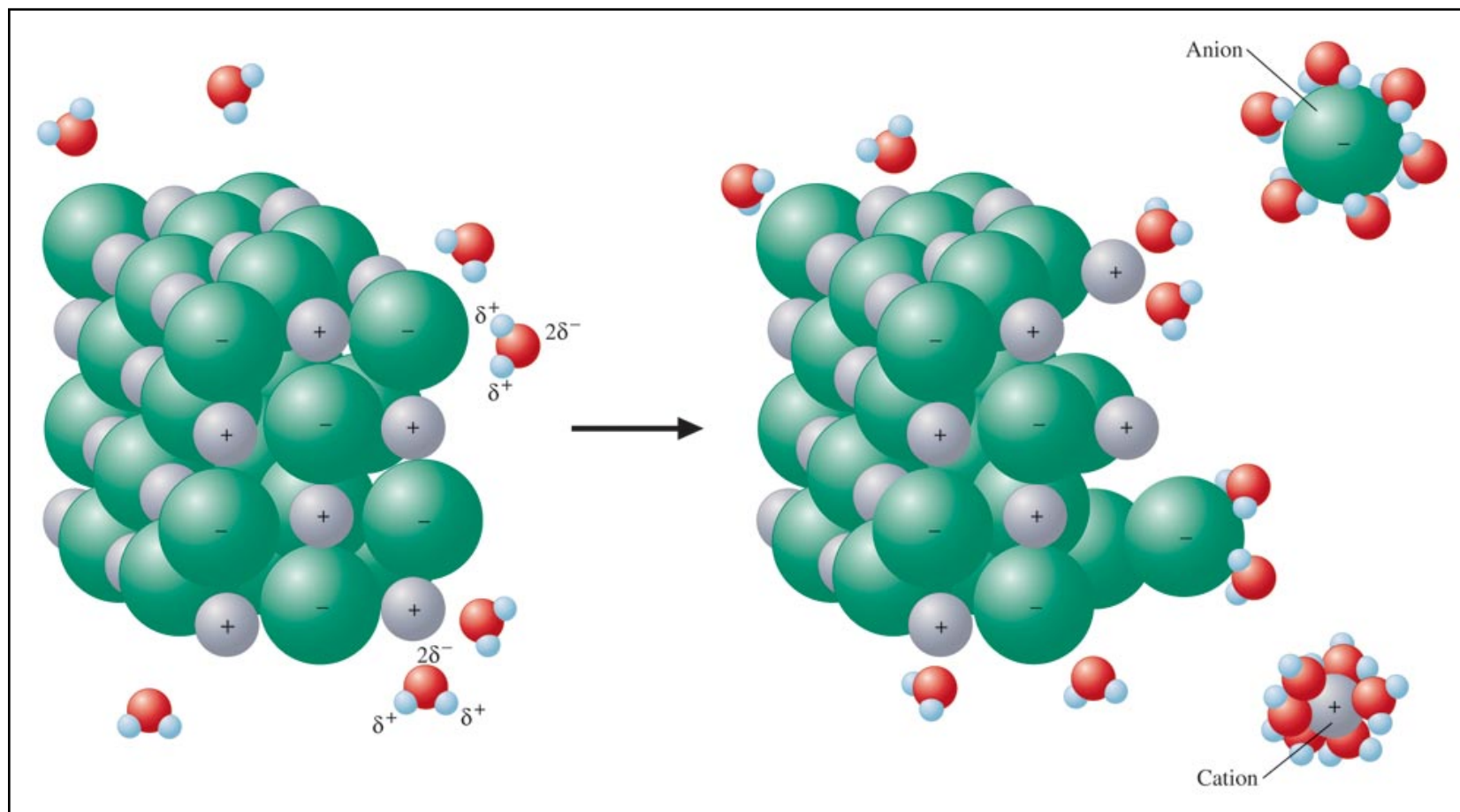


Figure 4.3a The Ethanol Molecule Contains a Polar O-H Bond Similar to Those in the Water Molecule

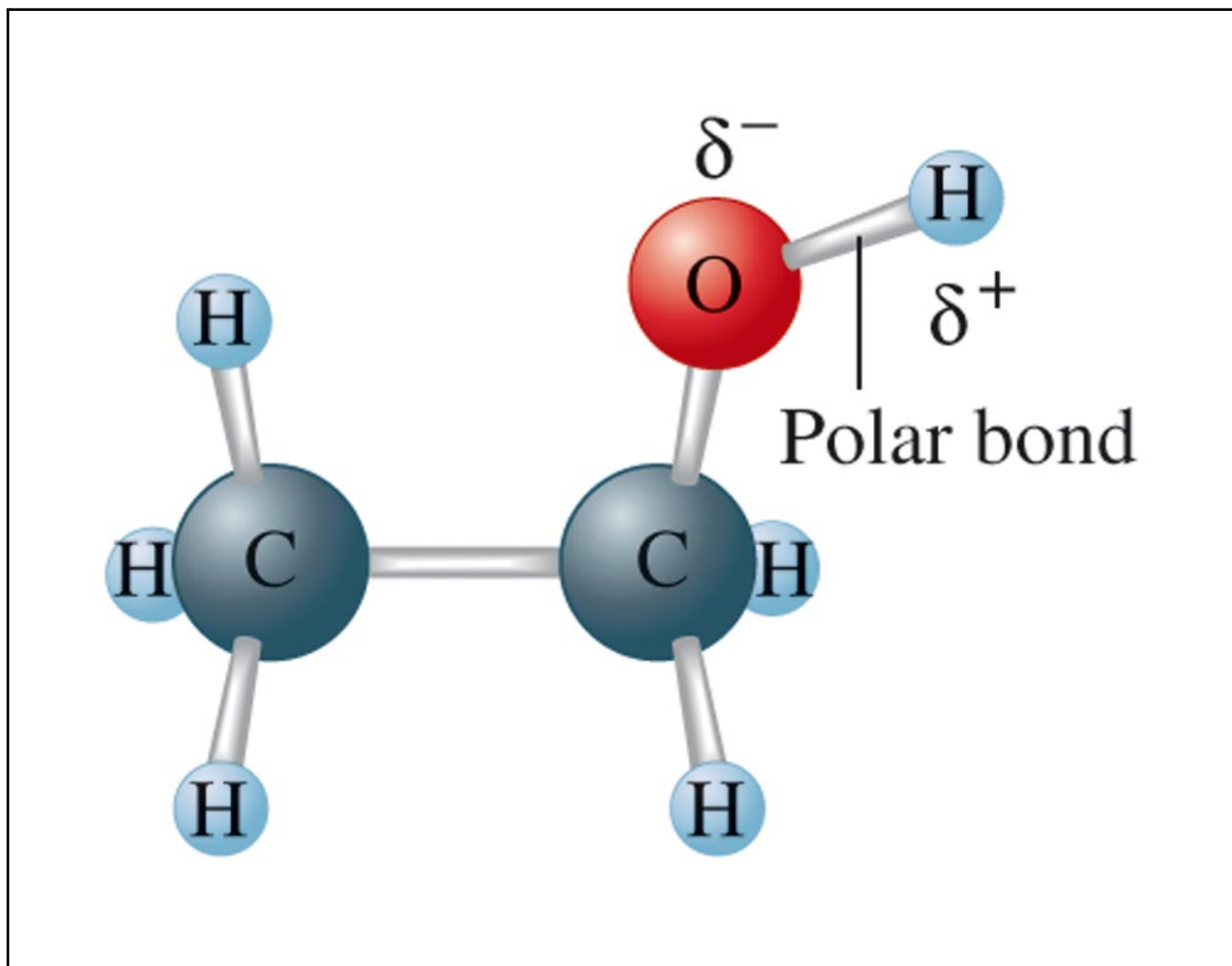


Figure 4.3b The Polar Water Molecule Interacts Strongly with the Polar-O-H bond in Ethanol

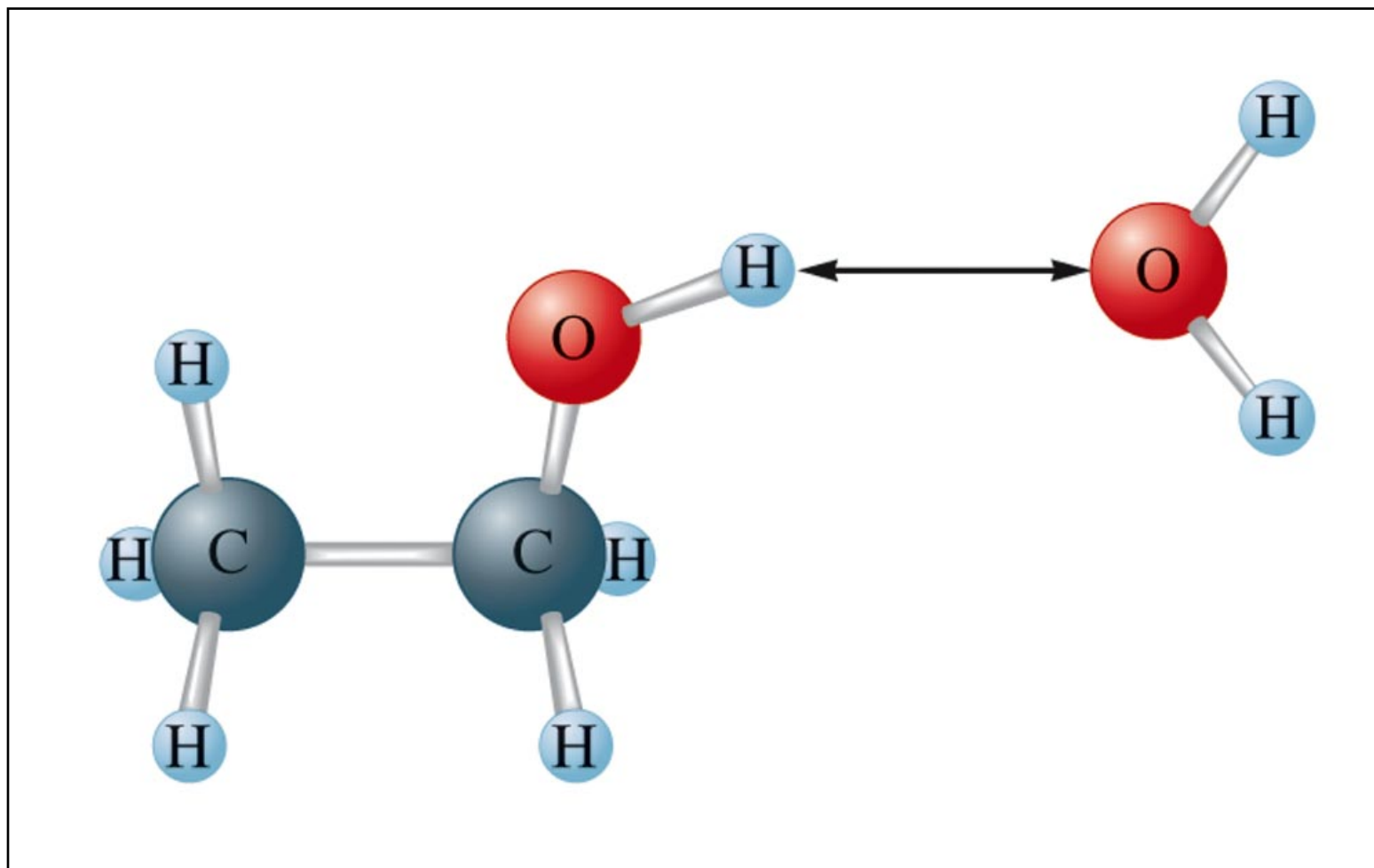


Figure 4.4a-c Electrical Conductivity of Aqueous Solutions

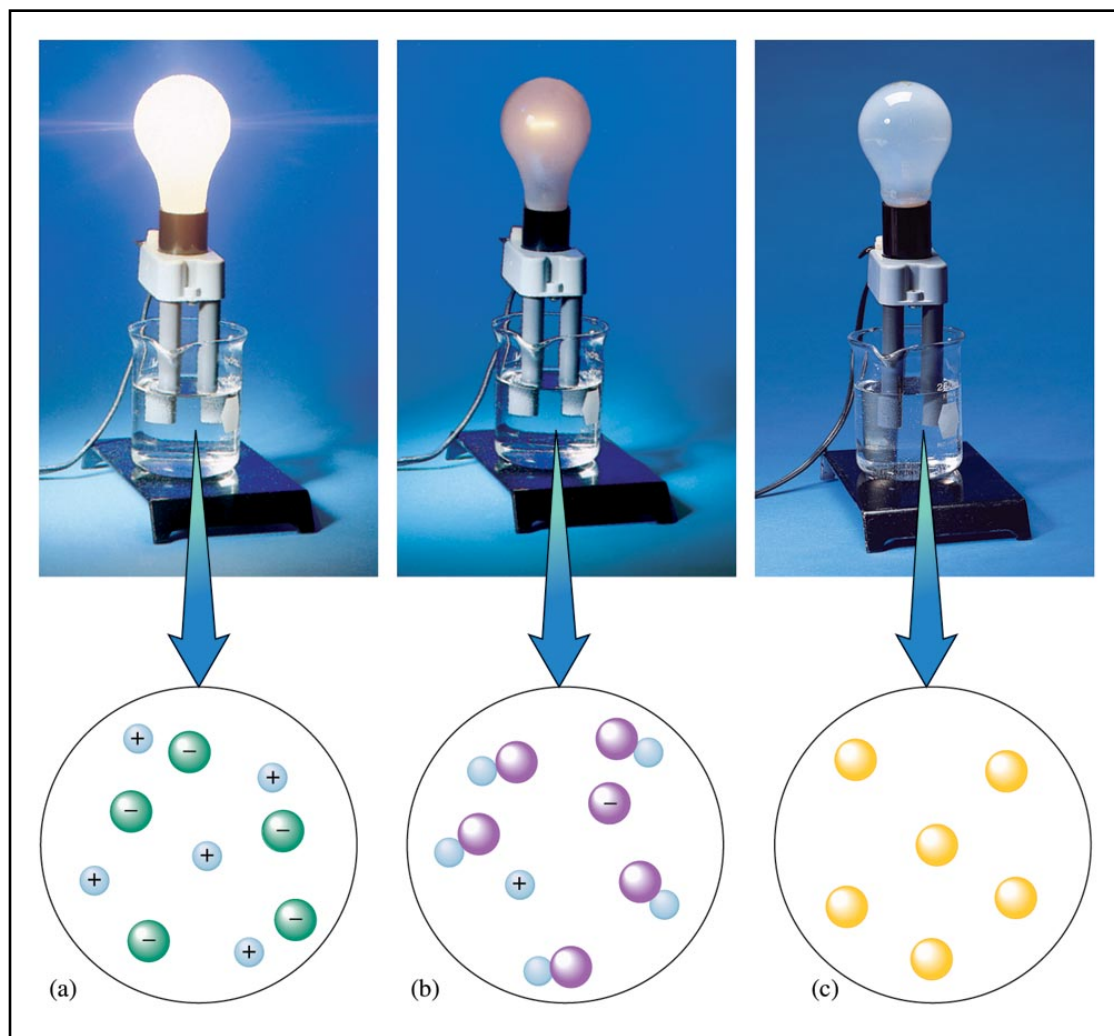


Figure 4.15 a&b The Reaction of K_2CrO_4 and $\text{Ba}(\text{NO}_3)_2$

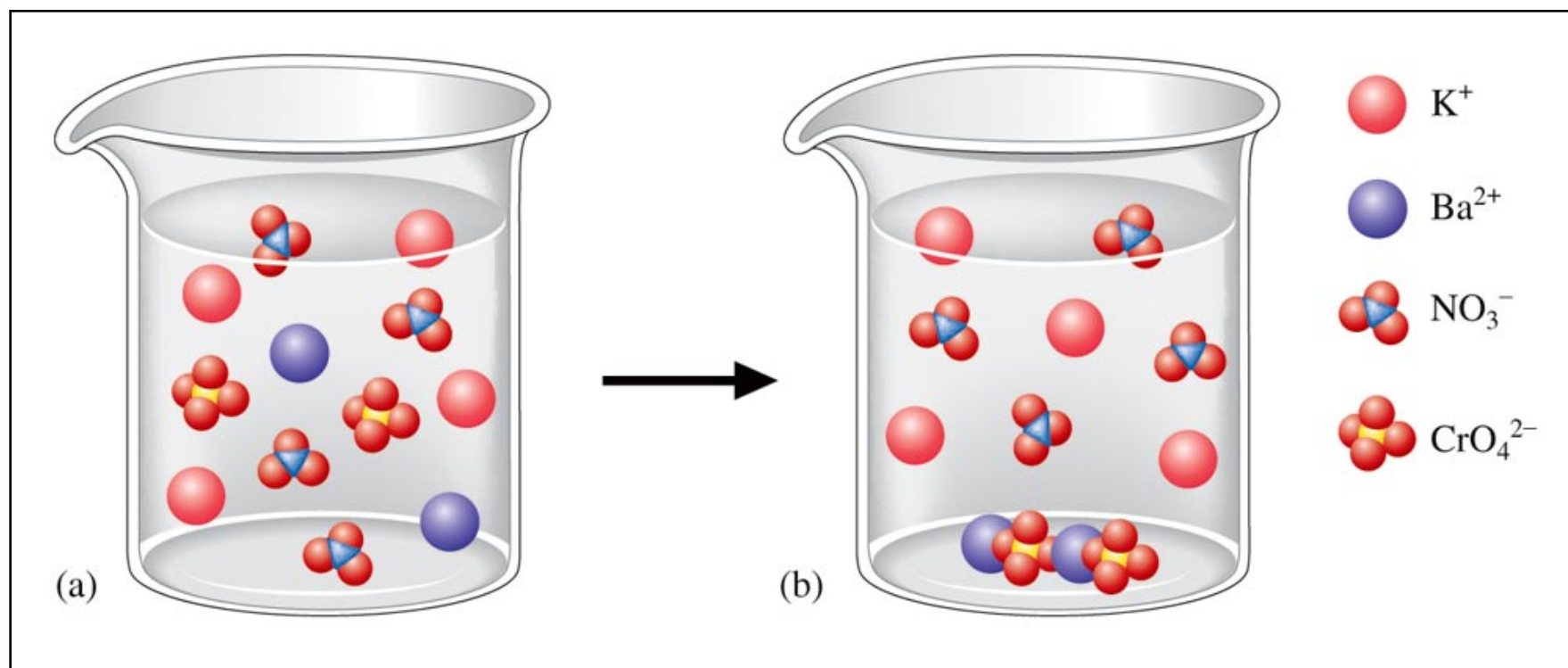


Figure 4.17 Molecular-Level Representations Illustrating the Reaction of KCl (aq) with AgNO_3 (aq) to Form AgCl (s)

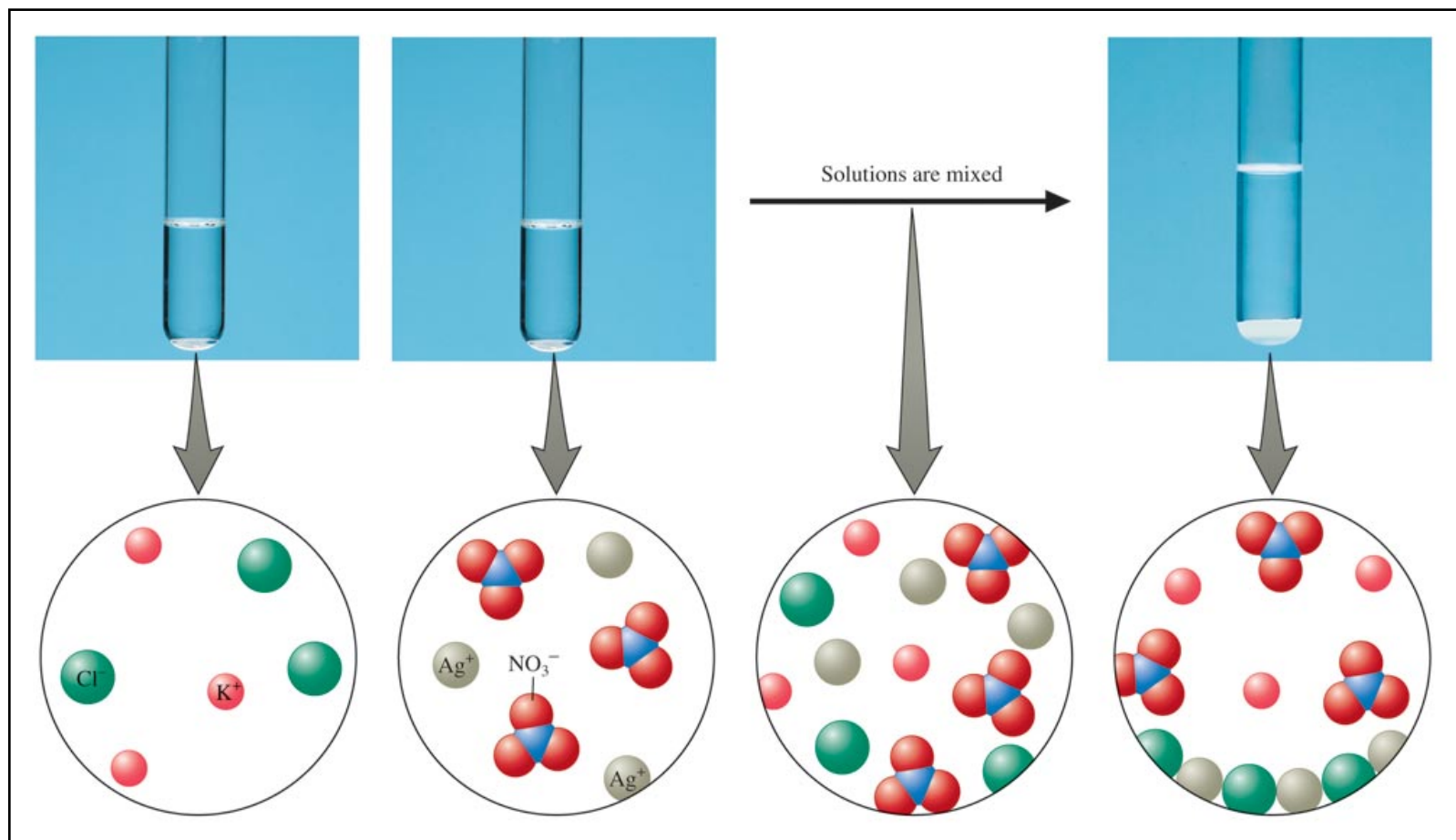


Table 4.1 Simple Rules for the Solubility of Salts in Water

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1. Most nitrate (NO_3^-) salts are soluble.
2. Most salts containing the alkali metal ions (Li^+ , Na^+ , K^+ , Cs^+ , Rb^+) and the ammonium ion (NH_4^+) are soluble.
3. Most chloride, bromide, and iodide salts are soluble. Notable exceptions are salts containing the ions Ag^+ , Pb^{2+} , and Hg_2^{2+} .
4. Most sulfate salts are soluble. Notable exceptions are BaSO_4 , PbSO_4 , Hg_2SO_4 , and CaSO_4 .
5. Most hydroxide salts are only slightly soluble. The important soluble hydroxides are NaOH and KOH . The compounds $\text{Ba}(\text{OH})_2$, $\text{Sr}(\text{OH})_2$, and $\text{Ca}(\text{OH})_2$ are marginally soluble.
6. Most sulfide (S^{2-}), carbonate (CO_3^{2-}), chromate (CrO_4^{2-}), and phosphate (PO_4^{3-}) salts are only slightly soluble.

Figure 4.20 A Summary of Oxidation- Reduction Process

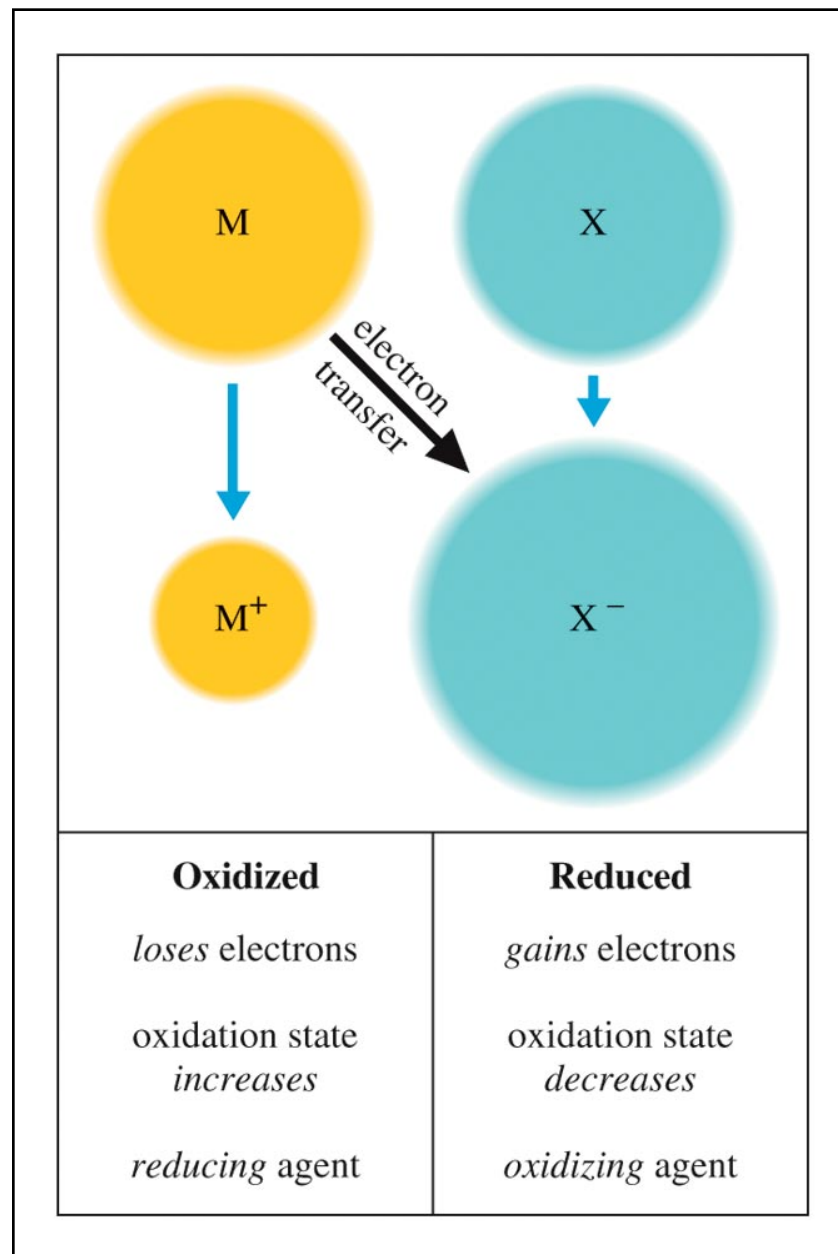
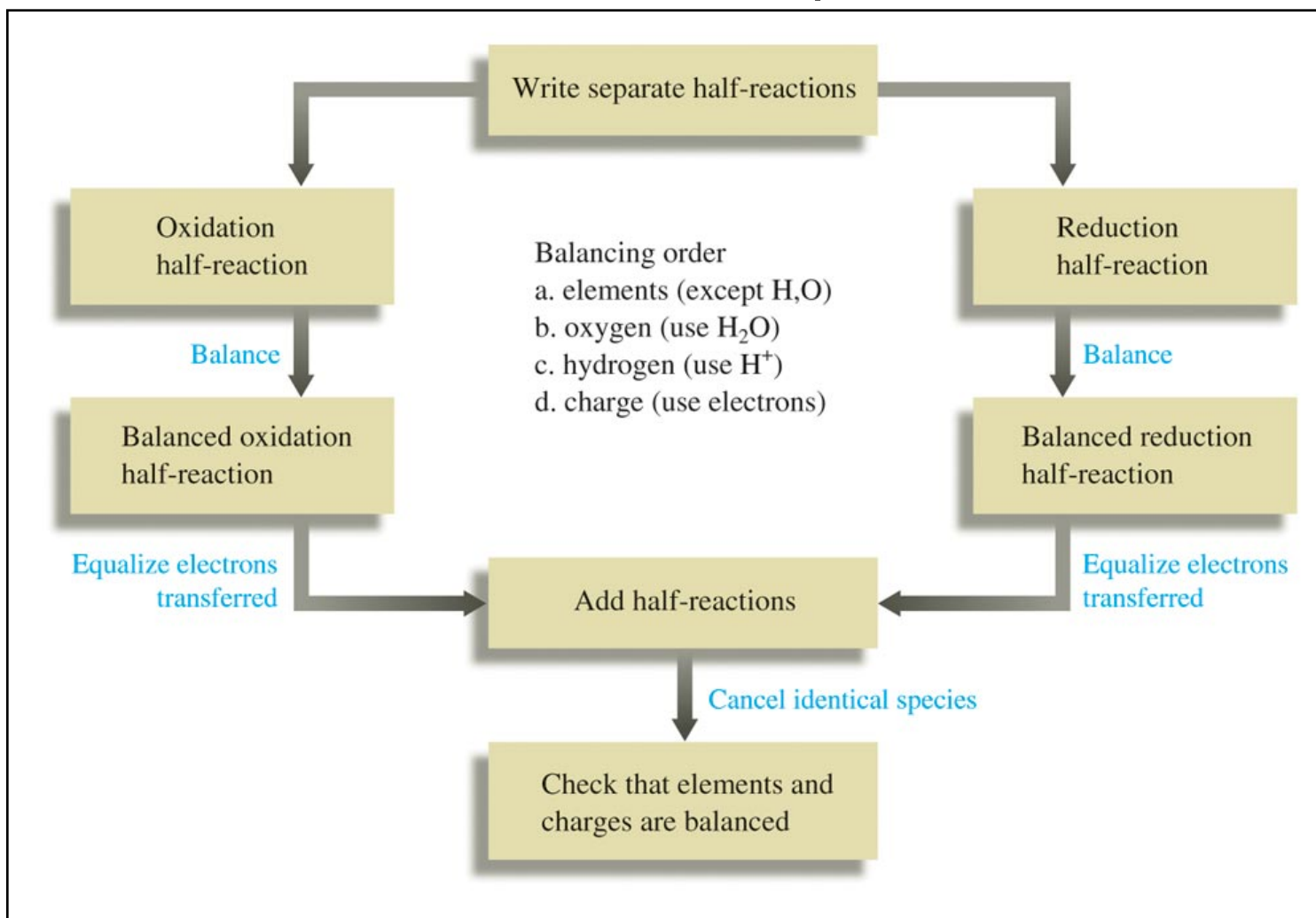


Table 4.2 Rules for Assigning Oxidation States

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The Oxidation State of . . .	Summary	Examples
<ul style="list-style-type: none"> An atom in an element is zero 	Element: 0	$\text{Na}(s)$, $\text{O}_2(g)$, $\text{O}_3(g)$, $\text{Hg}(l)$
<ul style="list-style-type: none"> A monatomic ion is the same as its charge 	Monatomic ion: charge of ion	Na^+ , Cl^-
<ul style="list-style-type: none"> Fluorine is -1 in its compounds 	Fluorine: -1	HF , PF_3
<ul style="list-style-type: none"> Oxygen is usually -2 in its compounds Exception: peroxides (containing O_2^{2-}) in which oxygen is -1 	Oxygen: -2	H_2O , CO_2
<ul style="list-style-type: none"> Hydrogen is $+1$ in its covalent compounds 	Hydrogen: $+1$	H_2O , HCl , NH_3

The Half-Reaction Method (Acidic Solution)



Provide balanced equations for the following situations

Sodium metal is dropped in water.

A strip of magnesium ribbon is placed in a solution of silver ions.

Solid potassium dichromate is added to an acidified solution of sodium iodide.

A solution of tin (II) chloride is added to a solution of iron (III) sulfate.

Chlorine gas is bubbled into a cold solution of concentrated sodium hydroxide.